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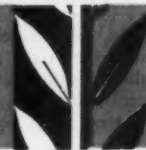
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February 3, 1951

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SCIENCE NEWS LETTER



THE WEEKLY SUMMARY OF CURRENT SCIENCE



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PHYSICS

Quantum Theory Not Final

Dr. Albert Einstein views idea that light and other radiation has a dual nature as ingenious but only a "temporary way out."

► **DR. ALBERT EINSTEIN** views the current idea that light and other radiation have a dual nature, consisting of both waves and particles at the same time, as "only a temporary way out" in describing the nature of the universe.

The great physicist discusses the German physicist Max Planck's quantum theory, now a half century old, in a special issue of the American Association for the Advancement of Science journal, *SCIENCE* (Jan. 26). Agreeing that the consequences of quantum theory that radiation possesses a kind of molecular structure in energy is "ingenious and amazingly successful," Dr. Einstein does not agree that it is a final solution. It is a temporary solution, in his opinion, even though, as he says "the double nature of radiation and of material particles is a major property of reality, interpreted by quantum mechanics in an ingenious and amazingly successful fashion, and looked upon as essentially final by almost all contemporary physicists."

Just as Dr. Einstein is striving by his own efforts and encouragement of others

to unify the theories that control both gravitation and electricity and magnetism, so he now looks forward to reconciling the idea that waves and gobs of matter and radiation can exist simultaneously.

The possibility that the physical laws of the universe are different in the extreme distances of the cosmos among the remote galaxies is suggested by Dr. Linus Pauling of the California Institute of Technology.

The discovery of a "megascopic quantum theory of the universe" should not be ruled out of consideration, Dr. Pauling states.

In the field of elementary particles, down in the range of the nuclei or hearts of atoms concerned in the release of atomic energy, significant changes in the present quantum theory remain to be made, Dr. Pauling predicts.

For the dimensions of the genes that control heredity, the present system of chemical and physical theory is sufficient, in his opinion, and no fundamental new principles need to be applied.

Science News Letter, February 3, 1951

PSYCHIATRY

Diet Aids Mentally Ill

Rigid fare of fats and proteins producing acidosis, followed by electric shock treatment, is effective in bringing improvement to patients.

► **ACIDOSIS** is helping some patients recover from serious mental illness. Too new to be called a cure, it may point to new ideas on the cause of mental disease from which a cure might be developed.

The acidosis treatment is reported by Dr. Julius I. Steinfeld, owner and medical director of the Forest Park Sanitarium, Des Plaines, Ill., (*JOURNAL, AMERICAN MEDICAL ASSOCIATION*, Jan. 27).

A "rigid diet" of fats and proteins, such as milk, meat and eggs, is given to produce the acid condition of the blood which is what doctors call acidosis. Sugars and starches were eliminated from the patients' diet.

Toward the end of a 12- to 14-day period on this diet, patients showed improvement. Electric shock treatments were given following the diet and brought still greater improvement in patients who had not previously been helped by shock or any other treatment.

One 44-year-old man with schizophrenia

had had fantastic ideas of persecution for two to three years and was constantly having hallucinations. A series of eight electric shock treatments, each consisting of two to three shocks, brought no improvement. But when three electric shock treatments were given after two weeks of the acidosis diet, he recognized that his strange ideas had been delusions. He returned to work and has been doing well for the four months since treatment.

He is one of four patients helped by the combined diet and electric shock treatment. The same results might be gotten by diet alone. But this would mean keeping the patient on the diet for four or six weeks, and two weeks is as long as patients will take this diet. Dr. Steinfeld plans instead to try the diet with acidifying chemicals.

The idea of bringing on acidosis to help mental patients came from findings of Dr. Steinfeld and a colleague, Dr. L. Gerber, in 1938. At that time they noticed that following shock treatment the blood and

spinal fluid of the patients became temporarily acid. The acidity was very marked in many instances.

The findings were surprising, because life cannot go on if the blood gets too acid or alkaline and the limits are rather narrow.

The temporary but marked shift toward the acid side might, Dr. Steinfeld reasoned, be an important factor in the good results obtained with shock treatment. The studies reported now seem to bear this out.

Science News Letter, February 3, 1951

PSYCHOLOGY

Automatic Machine Output Influenced by Operator

► **TWO NYLON** stockings may not be perfect mates even if they were made from the same lot of yarn on the same automatic machine with the same settings.

If two different operators were running the machine, one stocking might even turn out a 9½ for a short girl and the other a 10½ for a girl with long legs.

The influence that the operator can have on the output of a supposedly completely automatic, push-button machine is revealed by Dr. John D. Coakley, of Dunlap and Associates, Inc., New York City.

On modern automatic machines, the operator does not add to or subtract from the number of stitches or from the number of courses knit into a stocking, once the initial setting has been made. Therefore, variations in the length of the foot or leg have previously been attributed to variations in the nylon yarn or to machine performance. They were considered a problem for the engineer, not the psychologist.

Dr. Coakley had three operators work on the same machine, one after the other. The same adjustments of the machine and the same lot of yarn were used throughout the run.

As each stocking came from the machine, it was weighed on a specially-designed electronic scale. Not only was the average weight of each man's stockings different from that of the others, but the stockings made by the same man differed from each other.

Although the machine used produces 24 stockings simultaneously, even these did not turn out identical. Some were heavier, contained more yarn and were larger than others.

Careful watching of the men at work showed that the operator can influence the weight of the stockings he puts out in at least 20 ways. Among these are the order in which he uses the controls and the way he stretches and inspects the stockings during knitting.

Details of the study are reported in **PERSONNEL PSYCHOLOGY**.

Science News Letter, February 3, 1951

SURGERY

Skewers for Broken Bones

Broken thighs can now be fastened together by a rod passed down the marrow. Casts and splints are not needed. Patients get out fast.

► BROKEN thigh bones can now be skewered together by a large metal rod passed down the marrow or hollow center of the bone. Casts and splints are not needed and many patients can be up on crutches and out of the hospital in three weeks.

The new technique was developed and used by German doctors on World War II battlefields. Results seen in prisoners of war led to three years of research by the Office of the Surgeon General of the U. S. Army and the American Academy of Orthopaedic Surgeons.

At the meeting of the Academy in Chicago, Dr. Hugh Smith of the Campbell Clinic, Memphis, Tenn., declared that this method "promises to be one of the greatest advances in the treatment of fractures of the long bones, particularly the thigh bones."

The Army became interested in the research because, by standard techniques, a soldier with a fractured thigh bone is a liability for a year, Dr. Smith said. When he finally does return to duty there is

some restriction on his ability and assignment.

Transportation of these soldier-patients is also a problem. In an emergency situation, a person in a body cast is practically helpless. Such patients also take up considerable space, an important factor in the transportation of wounded by plane.

The Army also considered the future threat of mass casualties, both civilian and military. Any method that in a few weeks will permit a patient to be up and walking can help considerably to relieve a serious shortage of hospital beds.

In June, 1949, complete sets of specially designed tools and equipment were distributed by the Army to 20 groups of investigators, three in Army general hospitals, two in VA hospitals and 15 civilian groups.

By Nov. 1, 1950, 700 skewers, technically termed medullary pins, had been inserted into thigh bones.

"Based on an experience of some 700 nailings," Dr. Smith said, "we are now well past the test pilot stage."

The study so far has revealed that:

1. The rods do not have a universal application either to all fractures or all bones.
2. The type of fracture, its location and other factors limit its usefulness.
3. The technique is a highly skilled procedure which should be carried out only by skilled surgeons working under ideal hospital conditions.
4. It must be limited to patients whose general condition and resistance are sufficient to justify and withstand a substantial major surgical procedure.

Dr. Smith told the doctors that "the most common error consists of inserting a pin that is either too long, too short, too big, or too small in diameter."

"A short or loose pin," he said, "provides inadequate fixation. Consequently insertion of such rods requires considerable planning before the operation is performed. There is no formula for determining the size of the canal in relation to the length of bone. Generally, young athletes with very large bones usually have rather small canals. Small, elderly women on the contrary may have very large canals. By a special X-ray technique the length and diameter of a canal can be measured to a practical degree of accuracy. From these films, the measurements can be made for the proper pin."

Science News Letter, February 3, 1951

ENGINEERING

Highway Telephones Expanding Rapidly

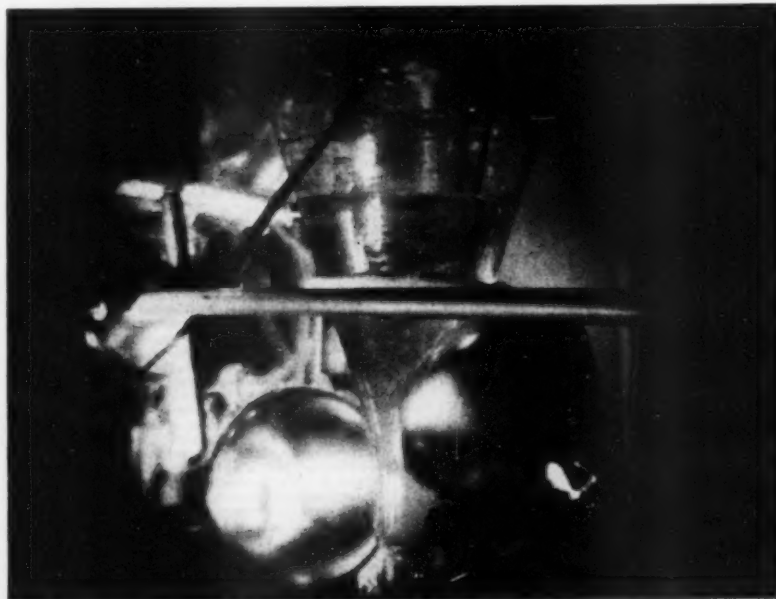
► TRAVELING motor vehicles equipped with radio-telephones are now being served by 110 base transmitting stations which are handling approximately 81,000 completed calls per month, the American Institute of Electrical Engineers was told.

This highway mobile telephone system was inaugurated in Green Bay, Wis., Aug. 28, 1946, the engineers were told by Louis A. Dorff of the Bell Telephone Laboratories, New York City. It now covers many major highways in the East and West, and statewide systems have been established in Michigan, Wisconsin, Minnesota, Illinois, Missouri, Kansas, Oklahoma, Arkansas and Texas.

When first inaugurated it was planned to operate all stations on a single channel of two frequencies, he said. This would allow a vehicle equipped with a normal single-channel radio set to travel anywhere in the United States and to make or receive telephone calls.

Later, because of sky-wave interference, it was found necessary to divide the entire country into seven zones, each assigned a pair of frequency channels. Vehicles traveling from one zone to another are able to use the different frequency if equipped with an additional oscillator unit with relay switched crystals.

Science News Letter, February 3, 1951



THROUGH THE PERISCOPE—This view is taken through the periscope looking into a hot cell in the new Hot Lab, Brookhaven National Laboratory. (See SNL, Jan. 20.) Here uranium isotopes and other radioactive materials are being separated for study. The solution in the vessel contains uranium and is being heated by the infra-red lamps below.

PSYCHOLOGY

Best Age for Combat?

No one really knows whether a boy of 18 is mature enough to be sent into battle. In World War II, those under 21 were below average in combat performance.

➤ AT WHAT AGE should boys be sent into combat? That is a question about which many opinions are being voiced these days. But objective evidence as to whether 18-year-olds are actually mature enough to make good combat soldiers is almost completely lacking.

No one knows whether a boy of 18 is ready for combat. Or whether he is mature enough at 17. Or whether 12 or 25 might be a better minimum age.

In the armies our troops are facing in Korea, the Communists are reported to be using boys of 12 and 13. High-school students at Seoul are said to have been marched off to camp in a body to be pressed into the Communist Army. Tens of thousands of these young soldiers have been killed. But whether their youth exposed them to unusual risks, or whether they stood a better chance of success in battle than older men, no one knows.

Psychologists have developed tests that show when boys and girls are mature enough to be ready to go to school. The conventional six-year age for school entrance is not right for boys, Dr. Frank R. Pauly, director of research of the Tulsa, Okla., public schools, recently reported to the American Association for the Advancement of Science. Boys develop more slowly than girls, Dr. Pauly found, and the school entrance age for boys should be set at least three to eight months later than the sixth birthday.

Inquiry of the various armed services revealed that no branch of the service is at

present conducting any study to determine similarly the age of combat readiness. An office in the Navy is making a study, the results of which are hush-hush, to determine the relation of age to combat readiness, but this is oriented more toward the problem of determining a maximum age at which reserve personnel should be called back to active service.

Some information is available from World War II about the performance of men of various ages. From the point of view of advancement, the golden age is from 25 to 29, neither too young nor too old. Men under 25 were more likely to go AWOL, and the men over 30 were more likely than younger men to become NP's. The Army does not seem to want to trust very young men with the responsibilities of an officer or a noncom.

In combat performance, too, the men under 21 did not show up as well as their elders. In this group, 31% rated below average in combat performance while only 23% rated above average. Here, too, the age 25 to 29 seems best; of these men 34% rated above average in combat.

We have no way of knowing how many of those under 21 were 18-year-olds, but they were probably few because out of 4,228,936 in the Army and Air Force at the end of 1945, only 284,000 were 18 years old.

Among the obstacles facing scientists who would like to make a study of combat readiness is the lack of any yardstick for measuring effectiveness in combat. The ratings of officers are not a very scientific measure.

A research team recently returned from Korea has been working on this problem. When a measure is found for success in combat, then it will be possible to determine what kind of men make the best soldiers.

Science News Letter, February 3, 1951

Chemical agents obtained from *filbert nuts* are used to give American cheese a superior flavor.

Infantile paralysis appears in all parts of the world, even in the tropics and in frigid zones.

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Question Box

FORESTRY

How many acres of Douglas fir in Oregon have been sprayed for spruce budworm? p. 71.

MEDICINE

What may be the cause of leukemia? p. 69.

NUTRITION

What vegetable is a good winter source of vitamin C? p. 72.

PHYSICS

Do we have the final answer on what is light? p. 66.

Photographs: Cover, Republic; p. 67, Brookhaven; p. 69, Boeing; p. 71, U. S. Forest Service; p. 78, National Bureau of Standards.

PSYCHIATRY

What effect has acidosis on mental disease? p. 66.

PSYCHOLOGY

Are nylon stockings coming off the same automatic machine always alike? p. 66.

Is a boy of 18 old enough for combat? p. 68.

SURGERY

How can skewers be used to fasten together broken bones? p. 67.

Why are nylon handles put on a bone surgeon's chisel? p. 73.

MEDICINE

Light on Leukemia Cause

New research suggests that blood disease may be due to a damming up of white cells rather than just their overproduction.

► **RESEARCH** which greatly broadens science's concept of leukemia and suggests new approaches to better understanding and treatment has been reported at the University of California School of Medicine. The work also suggests a way in which some cancers may grow.

For 125 years physicians have accepted, with some modifications, the idea of a German pathologist, Rudolph Virchow, that leukemia is caused by an overproduction of white blood cells.

The California research suggests a concept which appears to be of equal importance. The new idea is that leukemia may be caused in part by derangement of the normal mechanism for removal of white cells from the blood, thus damming up the white cells in the blood.

In either case one would expect an oversupply of white cells in the blood, which is characteristic of most types of leukemia.

The evidence does not eliminate the overproduction theory as a factor in leukemia. It places the new concept as an additional factor, possibly as important as overproduction as a cause of leukemia.

The scientists first demonstrated the removal mechanism in leukemia, a mechanism which has been poorly understood. White blood cells have a cycle similar to that of other body cells: cells are generated, have a characteristic life span, then are removed or "die."

The scientists located the removal mechanism for white blood cells in the lungs. They performed the experiments first in animals and then in man. They injected enormous quantities of white cells from leukemic individuals into non-leukemic persons, as many as 240 billion in periods ranging up to 90 seconds.

Blood samples at the right side of the heart reflected the elevated white cell count. But after the cells had passed through the lungs and to the left side of the heart, it was found that the surplus had been eliminated in from 60 to 90 minutes.

In addition to its implications in leukemia, the demonstration of such a mechanism is an important fundamental addition to fundamental physiological knowledge.

The work warrants speculation that similar mechanisms operate in other diseases of the cancer family, in which leukemia has been placed. Since all tissues of the body are involved in the cycle of regeneration and removal of cells, perhaps the breakdown of the removal mechanism may be responsible in part for the growth of some tumors.

The research was reported by Dr. Howard R. Bierman, Dr. Jonathan T. Lanman, and Dr. Ralph Byron. (Blood, December). It was done in the Laboratory of Experimental Oncology, a branch of the National Institute of Health, located at the University.

Science News Letter, February 3, 1951

PHOTOGRAPHY

Traveling Camera Keeps Pace with Horses

► **CLOSE-UP** motion pictures of race horses speeding around the track can be made with a camera and camera carrier that travels along the inside edge of the track, keeping pace with the animals. The carrier travels suspended from an overhead track just far enough away from the racers to get good focus.

This camera system is the invention of Max O. Miller, Los Angeles. Patent received is 2,538,910. Rights are assigned to Motoview, Inc., Carson City, Nev.

The official name for the invention is a "television and photography system for race tracks." The speed of the traveling camera

is regulated to keep abreast of the racers by remote control by an operator who uses a television view finder mounted in the carriage. This enables him to see the same field of view as that being photographed.

Science News Letter, February 3, 1951

ENGINEERING

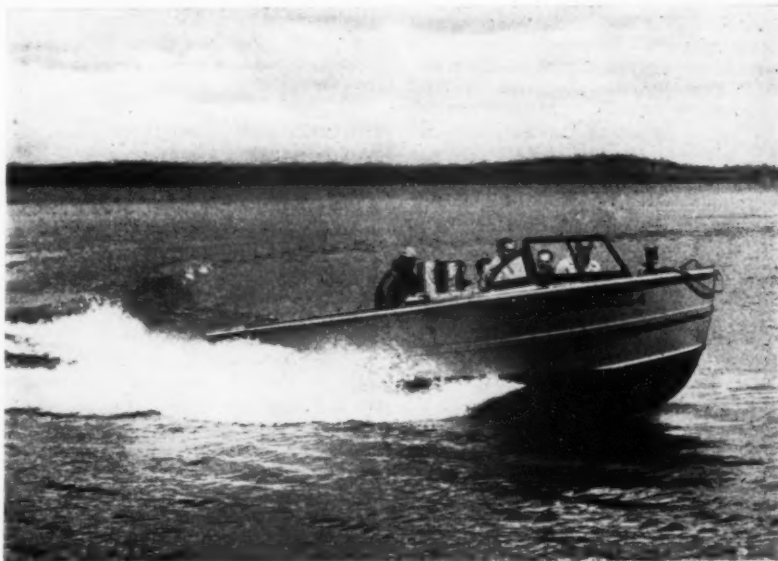
Gas Turbine Engine Powers Minesweepers

► **A FORWARD** step in the adoption of gas turbine engines to marine uses was revealed in the announcement that lightweight Boeing engines of this type will be used by the U. S. Navy to supply electric power to minesweepers.

The engine to be used is an improved version of the lightweight gas turbine engine developed by Boeing Airplane Company which has been in use for nine months on an experimental basis in a highway truck. This same engine has also been tested by Boeing in a 24-foot Navy personnel boat. A production contract has now been received by Boeing from the U. S. Navy.

The engine to be used in the minesweepers is a 175-horsepower turbine with several significant changes from the version used in the truck. These include a modification of the reduction gear assembly, enlarged bearings and shaft, a lighter mounting frame, new accessory drive unit, and new circular exhaust outlets permitting the turbine to be installed in a smaller space than formerly required.

Science News Letter, February 3, 1951



TESTING GAS TURBINE—This 24-foot Navy personnel boat is pictured making a test run of the Boeing gas turbine engine which the Navy plans to use to power minesweepers.

ENGINEERING

Cable With Amplifiers

Underwater telephone lines with built-in amplifiers 40 miles apart provide 24 high-quality talking paths on installation 115 miles long.

► UNDERWATER TELEPHONE cables, with built-in amplifiers, have proved effective on a 115-mile installation between Florida and Cuba, it was indicated by J. J. Gilbert, Bell Telephone Laboratories, at the meeting of the American Institute of Electrical Engineers in New York.

Two such cables were recently laid between these two terminals, one for northbound and the other for southbound transmission. Together they provide 24 high-quality talking paths. Their built-in amplifiers are spaced about 40 miles apart, and are powered with current carried along the same coaxial conductors that carry the voice.

The underwater cables bulge from one inch in diameter to three inches in the 25-foot length that contains the amplifiers. The amplifiers themselves use specially developed vacuum tubes which are thought to be able to function, unattended, for perhaps as long as 20 years. The cable is flex-

ible enough for deep-water laying, yet rugged enough to withstand pressures encountered a mile below the surface.

An improvement in the carrying capacity of "short haul" telephone cables was described at the same meeting by three other Bell Telephone Laboratories scientists. They were R. S. Caruthers, W. E. Kahl and L. E. Pedersen. Particularly described were two installations between Harrisburg and Sunbury, Pa.

The system provides 12 high-quality telephone circuits simultaneously on only two pairs of wires, thus avoiding the costly installation of many new cables. Many of its advantages have been realized for a number of years in long distance telephone circuits, but cost of terminal equipment has heretofore prevented its economical application in short-haul circuits. Development of small-size, low-cost apparatus makes the new application possible.

Science News Letter, February 3, 1951

ENGINEERING

Heat Pump Uses Power

► BEFORE converting from conventional house heating to modern heat pump systems the cost of the electric power needed should be taken into consideration, it was indicated at the meeting of the American Institute of Electrical Engineers in New York.

A report of a study of five home installations for year-round air-conditioning was presented at the meeting by Philip Sporn and E. R. Ambrose of the American Gas and Electric Service Corporation, of New York City. The homes were located in Virginia, Tennessee, Ohio and Indiana.

The electric load for heat pumps "can easily equal, and perhaps exceed several times, the present day total domestic electric consumption," they stated. "Average figures show that annual energy consumption of an all-electric residence with a heat pump is approximately three and one-half times as great as for the same residence without a heat pump."

Heat pump systems utilize heat from the earth below frostline, or heat from water in deep wells, for heating buildings. No matter how cold the earth or water may be, it contains heat. Some of this heat is picked up by circulating a refrigerant through buried pipes and is built up and delivered to rooms of the home. The prin-

ciple employed is somewhat the same as that used in the electric refrigerator, but it is working in reverse. Electric power is required to cause the circulation.

Science News Letter, February 3, 1951

MEDICINE

Mechanical Cougher For Polio Patients

► A MECHANICAL cougher for infantile paralysis patients who have breathing difficulties was announced by Dr. Alvan L. Barach of Columbia University at a polio conference in Houston, Texas.

The conference was sponsored by the National Foundation for Infantile Paralysis in cooperation with Baylor University College of Medicine and the Southwestern Polio Respiratory Center.

Polio patients with respiratory involvement not only have trouble breathing. They are unable to cough normally. As a result, they cannot expel secretions from their lungs and bronchial tubes. This may lead to serious, often fatal, complications.

The mechanical cougher is attached to a pressure equalizing chamber which looks much like the regulation iron lung. Changes of pressure within the tank provide a flow of air in and out of the patient's

lungs. With this type of respirator the patient can breathe at will to the extent to which he is able and does not have to fight against a controlled breathing rate.

Artificial coughing is provided by a close fitting baffle around the patient's neck and a hair trigger air valve geared to operate in one eight-hundredth of a second. This permits a sudden and explosive compression of air on the patient's chest and abdomen which simulates the mechanism of a natural cough and expels the collected secretion from the patient's lungs and bronchial tubes.

Science News Letter, February 3, 1951

ENGINEERING

More Engineer Students Needed by Profession

► MORE COLLEGE students in engineering courses are needed to fill the demand for trained men in these professions, it was indicated at the meeting of the American Institute of Electrical Engineers in New York.

Enrollment of engineering students was stimulated by war conditions during the past decade, the scientists were told by Titus G. LeClair, of Chicago, president of the Institute. However, enrollment is now beginning to drop, he said, because of "rumors" that there would be a surplus of engineers.

It is anticipated that 31,000 students will be graduated from engineering courses in 1951. This will decrease to 15,000 in 1954, and the number of "high school enrollments indicate further reductions beyond 1954 unless more high school graduates go to college, or a higher percentage than formerly choose the engineering course."

The 1940-50 engineering graduates were absorbed readily into industry without lowering salary standards, he said. "We can truthfully say that any qualified young man may enter an engineering college without any fear that the profession is approaching a saturation point."

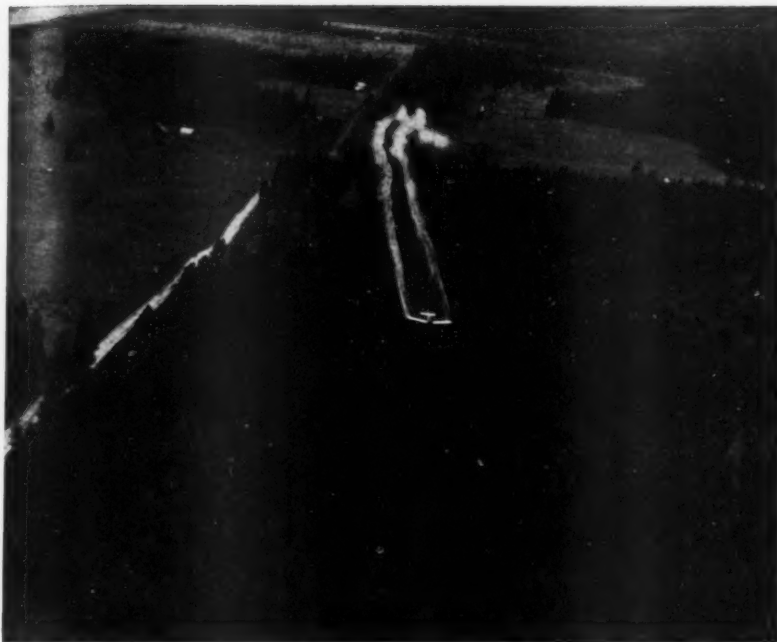
Science News Letter, February 3, 1951

A recent survey made by a paint manufacturer indicates that women prefer for interior decorations in their homes about the same colors that Nature uses in the plant world.

Zirconium ore is rather plentiful in some parts of Brazil; this metal is used in steel alloys and now for neutron shields in atomic furnaces.

Many race horses, when running at the track, are shod with lightweight aluminum shoes.

In the Great Smokies in North Carolina and Tennessee there are 40 mountain peaks more than a mile high.



PEST WARFARE—This plane is waging chemical warfare against a pest threatening to destroy our forests—the spruce bud worm. The picture was taken over the Umatilla National Forest, Oregon.

FORESTRY

Pests Damage Forests

With diseases, insects kill trees at a rate rivalling fire. Helicopters used in defense of forest area to spray insecticides or weed killers.

► **INSECT** pests and diseases moving in on our forests damage them at a rate that rivals fire as a destroyer. Lyle F. Watts, chief of the U. S. Forest Service, declares in his annual report to the Secretary of Agriculture.

Large forest areas in the Western states are threatened by very serious infestation of the spruce budworm and various types of bark beetles. Unless this pest is soon controlled, it may ruin some 12 billion board feet of timber valued at about \$50,000,000, he predicts.

Forest tree diseases, such as the chestnut blight about 20 years ago, can wipe out entire species. Oak wilt in the central states and the white pine blister rust are now causing serious damage, and threaten to cause much more. These diseases can be beaten down only by continuous battle, the report states.

Two of the most important insect control projects of 1950 were the aerial dusting of 940,000 acres of Douglas fir in Oregon to control the spruce budworm and

the hand spraying of 800,000 spruce trees in Colorado to destroy beetles. The cost of these projects is shared by private individuals and government agencies that benefit from them.

Use of helicopters to spread plant killers, such as 2,4,5-T, shows considerable promise.

The forest area under organized fire protection now consists of 83% of the total in need of such protection. Although this is a gain over previous years, there is still an urgent need to extend fire protection to 70,000,000 acres of forest and watershed not now covered. About two-thirds of this forest land is in the Gulf and Southeastern states and includes some of the nation's most productive forests.

"A milestone in wilderness area protection" was the establishment of an airspace reservation over the Superior Roadless Areas in Minnesota, the report states. Airplanes are now forbidden to land in or to fly at less than 2,000 feet above the ground over this area. This helps to save the wilderness value of the forest by limit-

ing the number of people who can get into the area and disturb the natural primitive conditions. This was the first airspace reservation ever made in America for other than national defense or safety purposes.

Science News Letter, February 3, 1951

PHYSICS

Two More Metals Found Superconducting When Cold

► **DISCOVERY** that two more chemical elements, osmium and ruthenium, are superconducting to electricity when in very pure form and when at the extremely cold temperature of less than a degree above absolute zero has been made at the Royal Society Mond Laboratory at Cambridge, England.

Dr. B. B. Goodman reports (*NATURE*, Jan. 20) that superconductivity, a virtual disappearance of resistance to electricity, occurs for osmium at 0.71 degrees K. and for ruthenium at 0.47 degrees K. (Kelvin).

Superconductivity has been recently discovered in uranium and rhenium as well, showing that superconducting elements are located in areas of the chemical periodic table between the two regions where the earlier superconductors were located.

Down to within a few tenths of absolute zero, the following elements were discovered to be not superconducting: lithium, sodium, potassium, barium, yttrium, cerium, praseodymium, neodymium, manganese, palladium, iridium and platinum.

Science News Letter, February 3, 1951

Little is known concerning the whereabouts of herring in the period between September and January.

Avocados are available the year around; its Florida harvest season is from June through the winter, and in California the season is in the winter and spring.

The opossum equals or beats the rabbit in the multiplication game; the female cottontail produces a yearly average of 17 young in four litters, while the opossum does the same in two litters.

On This Week's Cover

► **NEW** Republic Thunderjet, jet-propelled fighting plane which has completed flight and other tests, has swept-back wings making it speedier than its 630-mile-per-hour predecessor, the F-84E, now doing valiant work in Korea. It can carry two droppable extra-fuel tanks and 18 five-inch aircraft rockets.

The view on the front cover of this week's *SCIENCE NEWS LETTER*, first in-flight picture, shows it carrying 24 five-inch High Velocity Aircraft Rockets.

Science News Letter, February 3, 1951

SEISMOLOGY

Third Wave in Earth New Clue to Quakes

► A CLUE to the mystery of earthquakes is the discovery of the underground pathway of the "third wave."

This is the vibration that trails along after the two major waves of an earthquake. It travels in the layer of sediment that lies on the floor of the ocean just above bed rock, Dr. Don L. Leet, director of the Harvard Seismograph Station, finds.

He first observed this third or "T" wave in 1935 and has been tracking it down since then, aided by new, more sensitive instruments. When the earth's crust adjusts violently, there is an earthquake. Vibrations from the quake spread out in all directions and are recorded at seismological stations throughout the world when the quake is a strong one.

The first and second waves sweep through the earth at about five and three-and-a-half miles per second. The third wave tags along at slightly more than one mile per second. The layer of sediment through which this third wave travels is estimated to be 18,000 feet thick in some places under the Atlantic Ocean.

Science News Letter, February 3, 1951

NUTRITION

Vitamin C in Winter From Sweet Potatoes

► UNLESS the housewife guards against it, the family's meals in late winter and early spring may be skimpy in the amount of vitamin C they provide. This vitamin, also called the anti-scurvy vitamin and ascorbic acid, helps keep body tissues healthy. Many vegetables and fruits lose some of their vitamin C content during winter storage. Sweet potatoes, however, keep a high proportion of their vitamins during curing and storage. They lose some vitamin C during baking, but retain this rather perishable vitamin better than some foods throughout the cooking process.

One medium sized sweet potato, an average serving for most persons, gives at least one third of the vitamin C needed for the day, nutritionists of the U. S. Bureau of Human Nutrition and Home Economics report. Oranges and other citrus fruits are also excellent sources of this vitamin. If the meals for a day include a medium sweet potato and half a cup of citrus fruit, the entire day's need for vitamin C will be filled.

Sweet potatoes also supply vitamin A in abundant amounts. This vitamin is essential to the young for growth and at all ages helps keep the skin and the linings of nose, mouth and inner organs in good condition. It plays a part in maintaining normal vision, especially in dim light.

Besides sweet potatoes and citrus fruits,

you can get vitamin C from tomatoes, fresh green cabbage and other fresh greens. Milk contains the vitamin in appreciable amounts. One quart would supply almost half the minimum amount required for the day and somewhere between a fourth and a fifth of the recommended daily allowance.

Science News Letter, February 3, 1951

INVENTION

New Plastic Insole Prevents Frostbite

► LESS danger from frostbite for soldiers in such winter climates as experienced in Korea is promised with a new plastic insole which provides an air space between sock and shoe sole and, being non-absorbent, drains off moisture from perspiration instead of absorbing it.

The sole is even more valuable in tropical climates. By carrying perspiration away from the feet, it is an aid in controlling such trouble as athlete's foot and others caused by germs and spores of fungus which work through the shoe.

In fact, it is valuable in all climates. It keeps the moisture that gets into the shoe while walking on wet streets away from the foot. It keeps the sock dry from perspiration, keeping them cleaner so that they can be worn for longer periods.

This sole is a removable type. It is made of several layers of woven plastic fibers, each layer forming a mesh like in window screens. Top and bottom layers are of a finer weave than the interior layer. After being cut to proper size and shape, the layers are fused together around the outer edges.

This so-called laminated plastic insole was awarded a patent by the U. S. Government in 1950. It is the invention of Prof. Earl Parker Hanson, University of Delaware, Newark, Del., and an Army man Robert L. Woodbury, Washington, D. C. It has been thoroughly tested by both American and British armed services.

Science News Letter, February 3, 1951

AERONAUTICS

Jet Engine Develops 14,000 Horsepower

► AIRPLANE jet propulsion takes a forward step with a new engine developed by Westinghouse in collaboration with the U. S. Navy. It is claimed to be the most powerful turbojet yet produced.

In spite of its high power, it uses less fuel per pound of thrust than its predecessor which now powers some of the nation's fastest planes. Its thrust is equivalent to 14,000 horsepower. With the use of an afterburner this can be greatly increased. It will be known as the J40. Its predecessor is the J34.

Science News Letter, February 3, 1951

IN SCIENCE

DENDROLOGY

Dutch Elm Disease Found in Illinois

► THE FIRST case of the deadly Dutch elm disease striking a tree in Illinois has been discovered.

Drs. J. C. Carter and L. R. Tehon of the Illinois Natural History Survey Division found the diseased tree near Mattoon.

Spreading fast throughout the country, Dutch elm disease and the dreaded phloem necrosis disease of elm threaten America's elm trees with extinction. At present, high-pressure, high-saturation DDT spraying is the most potent weapon in the battle to save our elms from the insect-spread diseases.

Science News Letter, February 3, 1951

MEDICINE

Infant Disease Spread By Air-Borne Germ

► SCIENTISTS have put the finger on one more germ that causes diarrhea and vomiting in infants. Its name is *E. coli* D 433. Two of the new antibiotics, aureomycin and terramycin, bring prompt improvement to the small patients and prompt disappearance of the new germ.

E. coli D 433 was found by English scientists last year to be the culprit in several outbreaks of diarrhea and vomiting among infants. Now Drs. Erwin Neter and Clare N. Shumway of the Children's Hospital and University of Buffalo, N. Y., have found it causing sporadic, non-epidemic cases of diarrhea in infants.

Dramatic proof that this germ can cause diarrhea came from feeding it to a two-months old infant who had been born with multiple defects, including brain defects. This baby who had not previously harbored this particular germ in its bowel discharges or respiratory tract had diarrhea and lost seven ounces in weight within 24 hours after getting a dose of *E. coli* D 433. Terramycin promptly cleared up the infection.

The germ was also found in the throat of one child who had diarrhea and in the passage between nose and throat in two out of four of the babies. Previously Dr. Neter has found a food poisoning germ in the upper respiratory tract of babies and children with diarrheal disease. All this suggests that germs causing diarrhea may spread through the air and invade the body through the nose and throat like common cold germs. This may be one way in which babies, particularly in nurseries, get diarrhea.

Science News Letter, February 3, 1951

ENCE FIELDS

ORNITHOLOGY

Game Birds Imported For Restocking Southwest

► **THREE** new types of wild game birds arrived in the U. S. by air. They will be tested for possible use in restocking the Southwest, from which native birds have mostly vanished.

Dr. Gardiner Bump, Interior Department biologist in charge of foreign game introductions, selected these three types as most promising for replenishing our depleted game bird supply during his just-completed seven-month tour of the Middle East.

Native to Iraq and Turkey, the 30 birds to be put on trial include the seese, or sand, partridge, the black partridge and the houbara, or bustard, types. Another type of bird, the chukor partridge, whose Indian cousin is now thriving in Washington and Nevada, arrived in a previous shipment for the same introductory trials.

After 22 days in quarantine, a guard against the introduction of any disease, the birds will winter at game farms in the Southwest. There scientists will study their eating habits and learn more about how susceptible they are to disease. They will also make sure the birds carry no hidden diseases or parasites.

If the birds pass the tests successfully, they will then be set free at carefully selected places where the climate and vegetation closely duplicate their native environment. If these wild game birds prove adaptable, and it will take two or three years to know definitely, then large numbers of the birds can be imported.

Science News Letter, February 3, 1951

ENGINEERING

Lightning Rods Needed On Chemical Plants

► **ADEQUATE** lightning rods are an absolute must for petroleum refineries, chemical plants and other hazardous structures, the American Institute of Electrical Engineers was told by A. M. Opsahl and J. Z. Linsmeyer, engineers of the Westinghouse Electric Corporation.

Research in the Middle Atlantic area shows that there are about 30 to 40 thunderstorm days per year, and about 10 lightning strokes for each square mile of sky area, they said.

Structures of appreciable height will attract strokes from an area about 3.5 times the height of the structure. On this basis, a building 100 feet square and 25 feet high, in level terrain, would be struck once every 40 years.

"While these figures are average and will be influenced by local conditions," Mr. Opsahl said, "a 55-foot mast in the middle of the building, or four masts each 15 feet high and placed 15 feet in from the corners will make the same building a likely target only once in 30,000 years, although the masts themselves might be struck once every 30 years."

Wood and masonry buildings are particularly susceptible to lightning damage because of resistance placed in the path of the bolt, he stated. The bolt will shatter these materials as it seeks metal objects coupled to the ground. Steel frame buildings, which can themselves act as lightning rods, should be equipped with lightning rods to protect the masonry covering the steel frames.

The large exposed steel structures of petroleum refineries can be considered self-protecting against lightning strokes if all joints are well bonded and the whole structure is well grounded, according to Mr. Linsmeyer. However, if they do not have good contact with the earth, lightning currents may go through the pipes connected to the tanks and cause sparking at the joints.

Science News Letter, February 3, 1951

SURGERY

Nylon Handles Put On Surgeon's Chisels

► **NYLON HANDLES** on the bone surgeon's chisel and heavy steel mallet reduce the shock to the patient from hammer blows during operations, Dr. J. D. Farrington, assistant clinical professor of orthopedic surgery at the University of Illinois, told members of the American Academy of Orthopaedic Surgeons.

The nylon handles also eliminate the danger of sparks flying about the operating room when the instrument is struck with a metal mallet. Less noise and less glare reflected from the bright lights of the operating room are other advantages cited by Dr. Farrington from this new use of nylon.

Science News Letter, February 3, 1951

RESOURCES

Daily Water Need Over 1,000 Gallons Each

► **ALTHOUGH** the average person drinks less than half a gallon of liquid in a day, over a thousand gallons of water per capita daily in this country are needed, the American Geographical Society reports.

Much of this is used industrially. For example, it takes 65,000 gallons of water, weighing 270 tons, to process one ton of steel.

Science News Letter, February 3, 1951

SURGERY

Screw in Short Leg Makes It Grow to Match

► **THE POLIO-SHORTENED** leg of a child can be made to grow and catch up with its mate by putting one or two screws into the leg bone near its actively growing end.

Success with this method of making legs match each other was reported by Dr. Charles N. Pease of Chicago at the meeting of the American Academy of Orthopaedic Surgeons in Chicago.

Dr. Pease's method is the opposite of one in use since 1933. That earlier method of matching legs consisted in slowing the growth of the longer leg by a surgical procedure known as epiphyseal arrest.

The screws in the bone in Dr. Pease's method causes an irritation which stimulates bone growth through increasing blood circulation. The screws may be of vitallium, stainless steel, brass, vanadium or ivory. The type of material seems to make little difference. The screws are left in the bone because they have never been found to do any harm.

In children about three years old the speed-up in growth of the short leg can be seen during the first three months after the operation. In older children it takes from four to six months before the growth change is noticeable. The speeded growth goes on for about two or three years and then gradually slows. The growth effect of the screws finally stops when they become firmly encased in fibrous tissue.

Among 10 children followed since 1939 is one boy who at the age of 10 had a shortening of one inch in one leg. After the insertion of the screws he gained a full inch in that leg. Within two years both legs were the same length and continued to grow equally.

The operation has been performed on children whose legs were shortened by congenital deformities as well as on polio patients.

Science News Letter, February 3, 1951

INVENTION

Machine Answers Telephone And Takes a Message

► **AN IMPROVED** attachment for the telephone in office or home, will automatically answer an incoming call in the absence of an attendant, and record any message the caller may want to leave. In addition, it can be used to record a two-way telephone conversation, and also a speech or sound apart from those transmitted over the telephone line.

Inventors are Assen Jordanoff and Norman Robin, New York City. Patent received was 2,539,139. Jordaphone Corporation, of the same city, has secured the patent rights by assignment.

Science News Letter, February 3, 1951

GENERAL SCIENCE

Super-Quiz for Science

This test will tell you about yourself. Thousands of high school seniors have just taken the National Science Talent Examination in annual search for future scientists.

By WATSON DAVIS

► HERE is the science quiz of the year. Take this test to find out whether you have scientific ability. You can try it on yourself and your friends. It will give you a hint as to whether you reason in the same way as the creative scientists responsible for our inventions and discoveries.

In America's mobilization for defense now underway, military and industrial and educational authorities recognize the necessity of discovering in our population all of those who can develop scientific and technical abilities. For this reason the work of thousands of science clubs in the nation's high schools and the Annual Science

Talent Search have taken on added meaning.

The sample questions here are part of the 2½-hour examination just taken by thousands of high school seniors all over the country, some of them your neighbors.

These young scientists were competing for top honors in the Tenth Annual Science Talent Search, an annual hunt for the cream of tomorrow's scientists.

Judges have scored the examinations and honors, some of them Westinghouse Science Scholarships, will be awarded.

You may now test yourself informally. You should be able to answer the specimen questions in not more than 25 minutes. Arrange to spend this time without inter-

ruption and finish all the questions at one sitting.

Even the most brilliant scientist of today would miss some of the questions in the full test. The quiz is purposely made extremely difficult. It is designed to test scientific aptitude, that is, ability to reason to a logical conclusion. You are not expected to make a perfect score.

None of the thousands of boys and girls who have taken Science Talent Search examinations has ever made a perfect score. Nor are they expected to do so.

SUPER QUIZ—Sample questions on this and the facing page, secret until now, are from Science Talent Search quiz just taken by thousands of high school seniors. What is your scientific ability? Answering these questions will tell you about your powers to reason in the scientific manner.

DIRECTIONS: Four possible answers are given for each question. Put an X in the parentheses in front of the number corresponding to that answer which you think is most nearly correct.

1. Galactose is
 - () 1. a constellation
 - () 2. a sugar
 - () 3. a variety of rose
 - () 4. an alloy
2. A substance produced by a living organism and having an antibacterial effect is classed as
 - () 1. antibiotic
 - () 2. antiseptic
 - () 3. detergent
 - () 4. germicidal
3. Through which of the following can sound waves not be transmitted?
 - () 1. gas
 - () 2. liquid
 - () 3. solid
 - () 4. vacuum
8. This type of diagram is employed in
 - () 1. biochemistry
 - () 2. geology
 - () 3. radiography
 - () 4. zoology



SECTION A

If periodically applied forces are causing vibration of a mechanical system which has a natural period of vibration, and if these applied forces are reversed in their time relationships so that the vibration of the mechanical system is being opposed by the forces which are now being applied to it, then the vibrations gradually die away so that the mechanical system comes to rest. Then fresh vibrations begin and are gradually built up which are exactly opposed in phase with those which the system was originally performing.

9. Gibbous refers to a
 - () 1. device on a boat
 - () 2. part of the throat
 - () 3. phase of the moon
 - () 4. type of ape

10. Silviculture refers to
 - () 1. an ancient civilization
 - () 2. breeding of termites
 - () 3. caring for a forest
 - () 4. mining of silver

11. The time required for a member of the solar system to go from some particular position relative to the sun as seen from the earth, back to the same relative position again is called its
 - () 1. conjunctive period
 - () 2. solar motion
 - () 3. sidereal period
 - () 4. synodic period

12. Aurora australis refers to
 - () 1. Australian bison
 - () 2. certain gold alloys
 - () 3. early morning rainbows
 - () 4. southern lights

SECTION F

Radioactive isotopes may be used medically for radiation treatment and for diagnosis of a limited number of diseases. The radioisotopes permit generalized irradiation of a patient, selective irradiation of bone, thyroid, spleen, and certain other body tissues, and localized applications of beta and gamma rays to some lesions. Also, radioactive and stable isotopes of an element may be used to trace the paths of that element. One can thus observe the behavior of specific atoms and molecules in a wide variety of biological, chemical, or physical systems, from test tube to factory vat and from microbe to man. By using isotopic tracers, elements can often be traced in quantities millions of times below chemically detectable amounts. More important even than sensitivity is the specificity of the method. A specific batch of atoms or molecules may be labeled and traced independently even in the presence of existing atoms or molecules of the same kind, and in spite of reactions of numerous other atoms and molecules. This permits the ferreting out and untangling of complicated processes that often could be determined in no other way.

PART B

QUESTIONS ON SECTION A

51. According to the above statement, the vibrations of a mechanical system which has a natural period of vibration
- () 1. are opposite in phase to that of a periodically applied force
 - () 2. gradually die away unless the time relationship of an applied force is periodically reversed
 - () 3. momentarily stop in transition from one phase to an opposite phase
 - () 4. require no outside force to set it vibrating

101. 1 side of a section = 1 mile
1 section = 640 acres
1 side of 40 acres (a square) =

- () 1. $\frac{1}{4}$ mile
- () 2. $\frac{1}{2}$ mile
- () 3. $\frac{3}{4}$ mile
- () 4. 1 mile

105. What is the fallacy in the following syllogism?
Some teachers are science teachers.
My teacher is a science teacher.
Therefore, my teacher is some teacher.

- () 1. Erroneous major premise
- () 2. Erroneous minor premise
- () 3. Inductive reasoning
- () 4. Inconsistent use of words

108. Each statement in Column I is a definition. Among the terms in Column II are those defined in Column I. For each definition in Column I put the number of its term (from Column II) in the parentheses.

COLUMN I

- () 1. A line along which warm air has been lifted from the earth's surface by opposing wedges of cold air.

COLUMN II

- 1. cold front
- 2. high

QUESTIONS ON SECTION F

70. Which of the following conclusions can properly be made on the basis of the paragraph?

- () 1. All elements have radioactive and stable isotopes.
- () 2. Chemical analysis of a chemical process is sometimes not so revealing as radioactive isotopic analysis.
- () 3. None of the other three conclusions given here can properly be concluded on the basis of the information given.
- () 4. The most important use of tracer isotopes is in the treatment of disease in man.

72. The statement that some radioactive isotopes of elements may be unstable is

- () 1. contrary to the paragraph
- () 2. made in the paragraph
- () 3. neither made nor implied in the paragraph
- () 4. not made, but implied in the paragraph

- () 2. A line between advancing cold air and a mass of warmer air. 3. isobar
- () 3. A line between advancing warmer air and a mass of colder air. 4. low
- () 4. A line connecting localities which report the same barometer readings. 5. occluded front
- () 5. An area where the barometric pressure is above normal. 6. warm front

111. Fill in the missing words:

The characteristic property of the atomic nucleus is that it has a _____ charge, which determines the atomic _____ of the atom.

PART C

You may start the test and then not finish. Or you may take one look at it and decide that it is too tough for you. That is your privilege, just as it was the privilege of the high school seniors. No one made the high school seniors take it. They could walk out on it—and many of them did, thus withdrawing from the competition.

Making the test especially difficult eliminates the persons who do not have the perseverance to finish a job. This ability to finish what is started is a prime requisite for solving scientific problems, whether they be in atomic energy, bacteriological research, industrial technology or in everyday life. Sometimes those who quit have reasoning ability, but it is not doing them any good unless they use it.

Your answers may show that you have hidden abilities in the field of science. However, if your score is not high, do not be disappointed, for very few people are gifted with the abilities necessary for creative scientific research.

And if you do well on this sample, it does not mean that you should quit what you are doing and become a scientist. To be a professional scientist requires many years of study and preparation as well as native ability. The test has merely revealed that you have a certain amount of this

native ability, and there are many situations in your everyday life that require this kind of ability.

Ready now to test yourself? There are three kinds of questions. Answer all questions in Part A by putting an X in the number of the answer that is most nearly correct. In the case of Part B, first read each paragraph and then choose the answer that is most nearly correct on the basis of the information given in the paragraph. In Part C, either pick the correct answer or fill in the missing words.

After you have completed the test, score yourself, using the answers printed on page 76.

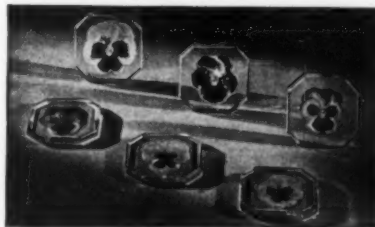
Having taken the test yourself you can appreciate the abilities of the boys and girls, 15 to 18 years old, who win honors in the nationwide search. The 40 top winners will arrive in Washington, D. C., March 1, to attend the annual Science Talent Institute.

They will meet leading scientists during their five-day stay. An additional 260 contestants are being given honorable mention and recommended to colleges, universities and technical schools as potential top-notch scientists of the future. In 23 states, further awards and scholarships are being awarded to state winners.

The science aptitude test is only one of

the methods used in selecting the boys and girls who are scientifically gifted. In addition, each contestant filled out a personal data blank and wrote a report describing some scientific project he has done or wishes to do. Teachers filled out a recommendation form and principals reported on scholarship of the contestants.

The science aptitude test was compiled by two of the Science Talent Search judges, Dr. Harold A. Edgerton, vice-president, Richardson, Bellows, Henry & Co., New



REAL PANSY COASTERS

These attractive coasters were made by embedding real pansies in Castolite, a new liquid casting plastic. With it students embed real flowers, butterflies, shells, photos, medals, etc. to make unusual jewelry, buttons, coasters, plaques, tiles, book ends, trays, other distinctive objects. Successfully used by hundreds of schools and colleges. Write for new FREE folder "Liquid Magic" showing things students can make. Many practical ideas. The Castolite Company, Dept. B-50, Woodstock, Ill.

York, and Dr. Steuart Henderson Britt, Director of Personnel, McCann-Erickson, Inc., New York, both leading psychologists.

Taking the test and competing in the Search comes as a culmination of high school science study and activity with science clubs for thousands of boys and girls of America's public, private and parochial secondary schools.

Science News Letter, February 3, 1951

Leaves and outer stalks of *celery* are higher in vitamin A and C than the inner stalks and "hearts."

"MIRACLE ELECTRONIC EAR" HIDES DEAFNESS

Transmits Even Whispers
With Startling Clarity!

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RADIO

Jets Strain Radar

Spotting high-speed planes that might roar over our borders to drop atomic bombs would be difficult for detecting radar. Study needed.

► SPOTTING high-speed jets that might roar over our borders to drop atomic bombs on our cities and industrial centers strains our detecting radar to its limits, Dr. Edward U. Condon, director of the National Bureau of Standards, has suggested.

Using our radar in the best possible way is the solution, and that job, he told the Conference on High Frequency Measurements, depends on the electronics specialists.

It means more accurate measurements of high frequency waves, for without these measurements, Dr. Condon pointed out, a radar operator cannot tell how effective his radar is, whether the range of his beam is 10 miles or 100.

The performance of radar and other high frequency electronic equipment depends on our knowledge of how microwaves, alternating many billions of times per second, behave. High frequency measuring instruments help to give us this knowledge and thus successfully send and receive these pulses.

The radio frequency spectrum has expanded somewhere between a thousand and a million fold in the last ten years, Dr. Condon stated. The Conference, sponsored by the American Institute of Electrical Engineers, the Institute of Radio Engineers and the National Bureau of Standards, celebrate the 50th anniversary of the National Bureau of Standards.

SCIENCE QUIZ ANSWERS

Now that you have taken the science aptitude test, you are ready to check your answers.

Correct answers to Part A are: 1, 2; 2, 1; 3, 4; 8, 2; 9, 3; 10, 3; 11, 4; 12, 4.

For Part B, Section A: 51, 3. Section F: 70, 2; 72, 4.

For Part C, 101, 3; 105, 4; 108-1, 5; 108-2, 1; 108-3, 6; 108-4, 3; 108-5, 2; 111, positive, number.

Out of the 20 possible right answers, if you got 16 or more correct, your score is very good. If you got 14 or more correct, your rating is high. Those who did as well on the entire test were in the running for consideration for honors in the National Science Talent Search. If you scored only 8 or less questions correctly, your talents probably lie in non-scientific fields.

Science News Letter, February 3, 1951

Future developments in high frequency electronics are vital to the national defense. Research, development and procurement in that field should therefore be planned carefully and logically, he told the Conference.

Science News Letter, February 3, 1951

ENGINEERING

Storage Battery Has Longer Life

► A NEW storage battery, developed particularly for the telephone industry, has a 50% longer life than present batteries due to the use of calcium instead of antimony as a hardener in the battery lead.

It is a development of Bell Telephone Laboratories, and will be used in telephone central offices throughout the nation. It is not, at present, recommended for other uses but may become commercially available at a later date after more information about its characteristics has been obtained.

The new battery is the result of studies made by Bell scientists concerning why a certain gas called stibine, antimony hydride, escaped from batteries. They found that antimony, a metal commonly used to harden lead, was passing undetected from one plate to another within the cell, speeding up corrosion and causing electrochemical action which resulted in partial discharge of the negative plate.

They found that small amounts of calcium could be used instead of antimony and the calcium stops the trouble for which the antimony was responsible. Less than one-tenth of one percent of calcium, compared with the 12% of antimony usually employed in battery alloy, does the job. This new lead-calcium battery loses only four percent of its total charge each month, and can go for several months without the addition of water.

Science News Letter, February 3, 1951

MINERALS USED IN THE MANUFACTURE OF GLASS, EARTHENWARE CHINA AND FIRE-PROOF BRICKS. 15 specimens 1½ x 2" plus in compartment box 9 x 12 x 1". Price \$3.00 prepaid.

COLLECTION OF RADIOACTIVE MINERALS. 9 specimens in compartment box 6 x 9 x 1". Size of specimens 1" plus. \$4.50 Express prepaid. Can not be shipped through mail. Booklet, Introduction to Geology for the layman 50¢ Write for free catalogue.

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ICHTHYOLOGY

NATURE
RAMBLINGS

Hitch-Hikers

► BACK IN that almost forgotten age when there were no automobiles the reigning generation practised the sport of "hooking rides" on horse-drawn wagons. This was greatly frowned upon by their fathers, who themselves went to great lengths to get that cherished talisman, a railroad pass. Hitch-hikers are still with us, and if the free pass is a thing of yesteryear on the railroads of the nation, there are still those who ride empty box-cars or the rattling rods from place to place.

But this system of getting from here to there by letting some other fellow take you along was invented long ago, probably long before man appeared on the earth at all, by a fish. This is the remora, hitch-hiker of the oceans, known to seafaring men the world over as the "pilot-fish" or "shark-sucker."

A strange creature of tropic waters, the remora catches rides on sharks and other large fish, on turtles and sometimes even on boats, by attaching itself to them with a powerful sucking-disk apparatus which covers the whole top of its head.

The sucking mechanism is an odd de-

velopment of the remora's dorsal fin, which starts like the dorsal fins of most other fish but rapidly changes into a powerful series of suction cups. Shaped somewhat like the sole of a shoe, the adhesive organ is divided into many compartments. With it, the flat-topped fish attaches itself to the belly of a shark or the bony stomach plates of a sea turtle, and is there to stay. No amount of twisting or turning or scaping against the bottom will serve to dislodge the hitch-hiker. The remora is as firmly planted as a country committeeman with his feet on the opposite seat in the smoker, and he won't get off until he sees fit.

The shark or turtle may take its passenger in bad grace, but there is nothing to do but grin and bear it. Aside from stealing transportation, the remora is not a parasite. It does not feed upon its host, as does the dreaded sea lamprey. Instead, it rides along until the larger fish finds a meal. Then the pilot-fish lets go and joins wholeheartedly in the feast. When the food is gone, back goes the suction. These are the two main goals in the remora's limited ambitions: free rides and free lunches.

But even so lazy a creature is often put to work by man. Fishermen can be lazy too. For thousands of years primitive fishermen in the West Indies, in Malaya, China, Australia, Polynesia, have used the remora as a sort of self-propelled, self-directing fish hook. They tie a cord to the pilot-fish's tail, and release it where there may be turtles. Away goes the remora. If a turtle is available, the remora attaches itself, the fishermen haul in on their line, and in comes remora, turtle and all.

Science News Letter, February 3, 1951

ENGINEERING

Induction Heating
Used in Metal Coating

► INDUCTION HEATING, replacing direct heating, is used in an improved process of applying metallic mirror surfaces to non-conducting materials in the method by which the metal is applied as a vapor in a vacuum.

How "uncontaminated surfaces of any metal may now be produced" was described by Robert G. Picard and J. E. Joy, RCA, Camden, N. J., to the American Institute of Electrical Engineers. Chemical silvering of glass, they explained, has made possible nearly all mirrors in use. Other metals may be plated on this silver coating, but the variety is severely limited.

One method of metallizing unplateable materials is to condense metal onto their surfaces from the vapor state. Since all metals may be evaporated, the range of mirror surfaces is great. Only a few metals, notably zinc and cadmium, do not form good mirrors by this process.

If bright surfaces are to be produced, the evaporation must take place in a high vacuum, in which is a filament of high melting point metal such as tungsten or

tantalum, these scientists explained. The metal coating is placed in this filament, and the filament heated by direct power.

The method has disadvantages that can be solved if the directly heated filament can be eliminated. This is now being done by placing the metal to be evaporated in a small crucible which in turn is placed within a metal coil, but not touching it. The coil is then heated by induction. It is a more efficient coating process, the scientists stated, and it results in a reduced loss of metal.

Science News Letter, February 3, 1951

In spite of America's 7,000 ice manufacturing plants, much *natural ice* is still cut for summer use on lakes and rivers of the northern states.

Staging hook, pulleys and ropes were recently attached to the top of a 150-foot factory stack, which needed repainting, with the help of a *helicopter* which hovered over the top.

When the famous *Brooklyn Bridge* was opened to traffic in 1883 some refused to use it believing it unsafe; today, the original steel cables, trusswork and suspenders carry 37,000 vehicles a day.

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ELECTRONICS

Machine Counts Worn Paper Currency

► YOUR beat-up, worn-out old bills, which must be counted before they can be retired and destroyed, will soon make their last as well as their first bow to a machine.

The National Bureau of Standards has just demonstrated an automatic, electronic machine for counting old paper money. New currency has been machine-counted for many years, but handling wrinkled, dog-eared notes was a difficult problem, calling for hand counting. Over eight tons of currency are redeemed every day, about

80% consisting of one-dollar bills.

Money returned to the Treasury for retirement is in the form of stacks of 100 notes, cut in half lengthwise. The machine, designed by H. M. Joseph and Carroll Stansbury of the Bureau, counts the half-notes in these packets at the rate of 30,000 bills per hour and rejects those with more or less than 100. From an inclined trough, a metal finger pulls the bottom packet, then wraps it tightly around a spindle, spreading the outer edges of the notes against

a curved metal plate. The spindle rotates the ends of the notes while a jet of air separates the notes from the packet.

A photoelectric eye catches the interruption of a light beam as the notes are unfurled. An electronic unit adds up the individual impulses, using the sum to actuate a sorting vane. Only those packets rejected by the machine, known as the NBS Electronic Currency Counter, need be counted laboriously by hand.

Science News Letter, February 3, 1951

• Books of the Week •

TO SERVE YOU: To get books, send us a check or money order to cover retail price. Address Book Dept., SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C. Ask for free publication direct from issuing organizations.

ADVANCES IN CARBOHYDRATE CHEMISTRY, Vol. 5—Claude S. Hudson and Sidney M. Cantor, Eds.—*Academic Press*, 322 p., illus., \$6.80. Volume 5 of this series presents such topics as Enzymatic Synthesis of Sucrose and Other Disaccharides, Enzymes Acting on Pectic Substances, and The Commercial Production of Crystalline Dextrose.

ATLAS OF HISTOLOGIC DIAGNOSIS IN SURGICAL PATHOLOGY—Karl T. Neuburger—*Williams and Wilkins*, 460 p., illus., \$11.00. The essential histologic lesions are presented by means of black and white photomicrographs. A section on exfoliative cytology by Walter T. Wickle is included.

THE ATOM AT WORK—Jacob Sacks—*Ronald*, 327 p., illus., \$4.00. A brief history of atomic energy and its applications. For the layman.

DRAGONS IN AMBER: Further Adventures of a Romantic Naturalist—Willy Ley—*Viking Press*, 328 p., illus., \$3.75. The author conducts the reader on a tour of strange fauna and flora. About one third of the book deals with animals and plants which suddenly made themselves at home in countries where they did not belong, such as the Japanese beetle. Other portions of the book tell the history of amber and the romantic tale of the woolly mammoth.

EARLY EMBRYOLOGY OF THE CHICK—Bradley M. Patten—*Blakiston*, 4th ed., 244 p., illus., \$3.50. A standard embryology text brought up-to-date.

FLORA OF PERU—J. Francis MacBride—*Field Museum of Natural History*, Publ. 653, 218 p., paper, \$1.75. A taxonomic listing of the vegetation of this country.

THE FROG: Its Reproduction and Development—Roberts Rugh—*Blakiston*, 336 p., illus., \$4.25. A description of the embryology of the frog. An excellent glossary of embryological terms is included.

IMPROVED NAILS FOR BUILDING CONSTRUCTION—E. George Stern—*Virginia Polytechnic Institute*, 23 p., illus., paper, 25 cents. A comparison of grooved nails with plain-shank and other type nails.

INGENIOUS MECHANISM FOR DESIGNERS AND INVENTORS, Vol. III—Holbrook L. Horton, Ed.—*Industrial Press*, 536 p., illus., \$6.00. A reference book.

AN INTRODUCTION TO THE SCIENCE OF PHOTOGRAPHY—Katherine Chamberlain—*Macmillan*, 292 p., illus., \$4.75. The physics of photography is stressed in this book written primarily for those studying photography without an instructor.

KOREA: An Annotated Bibliography of Publications in Far Eastern Languages—Edwin G. Beal, Jr. and Robin L. Winkler, Compilers—*Library of Congress*, 167 p., paper, \$1.15. Essentially an expansion of the book, **KOREA: A Preliminary Bibliography** which was issued in July, 1950.

KOREA: An Annotated Bibliography of Publications in the Russian Language—Albert Parry, John T. Dorosh and Elizabeth Gardner Dorosh, Compilers—*Library of Congress*, 84 p., paper, 65 cents. Covers books, monographs and periodical articles.

LABORATORY MANUAL FOR BRIEF COLLEGE CHEMISTRY—Leon B. Richardson and Andrew J. Scarlett—*Holt*, rev. ed., 229 p., illus., paper, \$2.00. To accompany the authors' text, *Brief College Chemistry*.

THE LA PORTE METEORITE—Sharat Kumar Roy and Robert Kriss Wyant—*Field Museum of Natural History*, 9 p., illus., paper, 25 cents. A brief history and geological analysis.

LEATHERCRAFT: Techniques and Designs—John W. Dean—*McKnight*, 251 p., illus., \$5.00. Techniques of the master craftsmen.

METHODS AND MATERIALS FOR TEACHING GENERAL AND PHYSICAL SCIENCE—John S. Richardson and G. P. Cahoon—*McGraw-Hill*, 485 p., illus., \$4.50. Many practical suggestions for developing laboratory skills. For elementary and high school science teachers.

MOTION AND TIME STUDY: Principles and Practice—Marvin E. Mundel—*Prentice-Hall*, 457 p., illus., \$6.65. A college text. Many problems are included for practice.

NATURAL CHILDBIRTH: A Manual for Expectant Mothers—Frederick W. Goodrich, Jr.—*Prentice-Hall*, 176 p., \$2.95. A handbook containing many helpful hints for mothers-to-be.

THE ORIGINS OF MODERN SCIENCE 1300-1800—H. Butterfield—*Macmillan*, 187 p., \$3.00. A brief history of modern science showing the effects of happenings from 1300 to 1800.

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RADIO

Saturday, February 10, 1951, 3:15-3:30 p.m., EST

"Adventures in Science" with Watson Davis, director of Science Service, over Columbia Broadcasting System.

Dr. Rome A. Betts, executive director, and Dr. John W. Ferree, director of public health, American Heart Association, will discuss "Heart Disease, America's No. 1 Health Problem."

PLANT EMBRYOLOGY: Embryogeny of the Spermatophyta—Donald Alexander Johansen—*Chronica Botanica*, 305 p., illus., paper, \$6.00. Dealing with the gymnosperms and the angiosperms.

PRACTICAL PHOTOGRAPHY—Robert A. McCoy—*McKnight*, 221 p., illus., \$4.00. A guide for the amateur.

PSYCHOLOGICAL BOOK PRELIMINARS, Vol. I, No. 1—John W. French, Ed.—*Psychological Book Preliminars*, quarterly, 188 p., paper, \$4.50 per year, \$1.25 per issue. Authors write descriptive summaries of their new books in the field of psychology. A bibliography of psychological book reviews appearing in American and British journals is included.

PUBLIC OPINION 1935-1946—Hadley Cantril, Ed.—*Princeton University Press*, 1191 p., \$25.00. Presents public opinion polls made by 23 organizations in 16 countries from 1935 to 1946 and includes such subjects as the atom bomb, international cooperation, and many aspects of World War II. It was prepared by Mildred Strunk.

RADIATION MONITORING IN ATOMIC DEFENSE—Dwight E. Gray and John H. Martens—*Van Nostrand*, 122 p., illus., \$2.00. How to use standard radiation detectors and interpret the results. It considers some of the protective measures against atomic explosions. For civil defense workers and others.

REST AND PAIN—John Hilton—*Lippincott*, 6th ed., 503 p., illus., \$10.00. A new edition of a classic source book in surgery. Edited by E. W. Walls, Elliot E. Philipp and H. J. B. Atkins, this is a specially bound limited edition.

THE SMUT FUNGI: A Guide to the Literature, with Bibliography—George William Fischer—*Ronald*, 387 p., \$6.00. A guide to the literature on the biology and control of some 330 species of smut fungi and the diseases they cause. Includes an excellent bibliography.

BASIC HUMAN ENGINEERING HANDBOOK

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TV MASTER ANTENNA SYSTEMS: Installation and Distribution—Ira Kamen and Richard H. Dorf—*Rider*, 356 p., illus., \$5.00. A working manual dealing with installation, maintenance, usage, manufacture and merchandising TV master antenna systems.

VITAMINS AND HORMONES: Advances in Research and Applications, Vol. VIII—Robert S. Harris and Kenneth V. Thimann, Eds.—*Academic Press*, 342 p., illus., \$6.80. This volume of this series includes such topics as The Physi-

POULTRY HUSBANDRY

Middle-Sized Eggs Needed

Major problem of poultrymen is to breed hens that will not give eggs of extreme size. Egg weight is highly heritable.

► UNLIKE many industries that strive to produce the most, the biggest, the tallest, or the smallest of their respective products, a goal of America's poultry industry is to produce an intermediate-sized egg.

This is the most profitable egg size, Dr. I. M. Lerner, associate professor of poultry husbandry in the University of California's College of Agriculture, found in a survey. Breeding hens which produce these intermediate eggs is a major problem to poultrymen.

Extreme egg sizes are undesirable. Eggs can be too small to be of much economic value and they can be too large to bring maximum net returns. The goal of a poultry breeder, therefore, is a bird which produces eggs of intermediate weights—averaging 24 to 26 ounces per dozen.

If a breeder starts with a flock of chickens characterized by too small eggs, he selects breeding stock which will produce larger sizes. After several generations he may find that he has overshot his mark, the result being that too many birds are laying jumbo-sized eggs.

In that event he is forced to reverse his selection standards to attain the desired optimum or intermediate size.

"The egg weight responds to selective breeding more rapidly than any other economic character of poultry," Dr. Lerner found.

Columbium is an important metal used in steel alloys to improve ability to withstand high temperatures.

Ammonia fumes are often prevalent in poorly ventilated poultry houses during the winter months and they are likely to cause eye lesions in chickens.

Many ceramic materials can withstand higher temperatures than metals, but ceramics are brittle and consequently their use has been very limited in engineering applications.

ology of Relaxin by Hisaw and Zarrows, Interactions Between Estrogens and Progesterone by Courrier and Steroid Configuration by Shoppee.

WET VENTING OF PLUMBING FIXTURES—John L. French, Herbert N. Eaton and Robert S. Wyly—*Gov't. Printing Office*, National Bureau of Standards report BMS 119, 27 p., illus., paper, 20 cents. Results of laboratory tests are given.

Science News Letter, February 3, 1951

This high heritability of egg weight permits the breeder to use the principle of "disassortive" mating, or mating of unlike birds. Thus, he may consistently mate large-egg laying females to sires from small-egg families and females laying small eggs to sires from large-egg families instead of taking the risk of having to change direction of selection over a period of years.

Science News Letter, February 3, 1951

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❁ **RADIATION** monitor, for use where radioactive substances are employed, is a one-pound device, without tubes or battery, that gives continuous direct radiation readings on a dial. It is equipped with a self-contained power source and a pointer to indicate strength of radiation.

Science News Letter, February 3, 1951

❁ **INFRA-RED** generator, for use in heating and drying, gives two temperature conditions at the same time, making it valuable in drying enamels and lacquers. This recently patented device is a glass tube within which is a coil of filament wire coated with an insulating cement.

Science News Letter, February 3, 1951

❁ **HUMIDITY** controller is for use with standard home or office electrical humidifiers or dehumidifiers and requires no special installation. It is merely plugged into the electric outlet, and the humidifier plugged into it. It operates automatically when its dial is set at the relative humidity desired.

Science News Letter, February 3, 1951

❁ **SAFETY** helmet for the youngster, shown in the picture, is made of a shatter-proof acetate plastic with a cloth interlin-



ing, felt chin and ear pads, and a foam-rubber headband. The helmet is available in either red or white.

Science News Letter, February 3, 1951

❁ **LOCKING HANDLE** for casement windows is designed for placement in a position where it does not injure venetian blinds during raising or lowering while the handle is in open position. It is an orna-

mental device for which a maximum clearance of only 175 inches is required in wide open position.

Science News Letter, February 3, 1951

❁ **TUBE TESTER**, for television cathode ray tubes, will test all TV picture tubes without removing them from the set or from the tube carton. It is a complete, self-contained instrument designed to test both electrostatic and electromagnetic tubes, including special tests for all tube elements.

Science News Letter, February 3, 1951

❁ **PORTABLE HEATER**, a gasoline-burner developed for military uses but suitable for other purposes, is small in size, consumes one-half gallon of fuel per hour, but delivers enough heat for a five-room house. Its electric fan can provide ventilation in warm weather.

Science News Letter, February 3, 1951

❁ **SIMPLIFIED** periodic table for chemistry students is an aid and a reference in the study of the 98 elements and of electron configuration. The main chart contains 40 elements, the others being on two attached turn-over flaps. Primary, secondary and other chemical relationships are shown in black; electron configurations in red.

Science News Letter, February 3, 1951

Do You Know?

The metal *gallium* is a liquid at normal temperatures.

To produce one pound of *aluminum*, four to six pounds of bauxite ore are required.

Synthetic *fibers* developed during the past few years threaten to push wool into the background.

Ramie, a widely used vegetable fiber, is stronger than silk, cotton or linen, and gets stronger still when wet.

Carbon black, widely used in automobile tires and other rubber goods, is made at a higher temperature than lamp black, and has a higher surface area because of its finer particle size.

A section of heavy *chain* fished recently from the bottom of Lake Erie is thought to be an anchor chain of an American vessel sunk by the British 140 years ago; no chain of the type has been made in the past 100 years.

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